REMARKS

Claim 1, 2 and 4-8 are pending in this application. Original claim 3 is canceled and new claim 8 is added in this response. It is believed that this Amendment is fully responsive to the Office Action dated March 28, 2003.

(I) Claim Rejections 35 U.S.C. §112

The examiner rejects Claims 1-5 and 7 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter that applicant regards as the invention.

Amendments are herein made in claims 1 and 2 to delete the term"high molecular." Also, amendment is made to delete "type" in claim 4. These amendments are believed to overcome the rejection under 35 U.S.C. §112, second paragraph.

In addition, the examiner asserts that the term "molecular weight" is indefinite since it does not specify what kind of molecular weight is used in the equation. However, the molecular weight used in the equation is not with respect to the polymer, but with respect to the monomer (a). This is apparent from the disclosure, for example, at page 6, line 5 of the specification as to the molecular weight of methyl methacrylate. Moreover, at page 4, lines 20 to 24 of the specification, the solubility parameter SP of the monomer (a) is calculated. Thus, since the molecular weight used in the equation is with respect to the monomer (a), it is unnecessary to incorporate a limitation of weight average molecular weight or number average molecular weight.

(II) Claim Rejections under 35 U.S.C. §103

(A) Claims 1, 2 and 4-7 were rejected under 35 U.S.C. 103(a) as being unpatentable over JP 03106942 in view of US 5,747,533 to Guzauskas. In addition, original claim 3 was rejected under 35 U.S.C. 103(a) as being unpatentable over JP 03106942 in view of US 5,747,533 to Guzauskas in view of JP06313019.

(B) Amendment was made in claim 1 to incorporate a limitation of original claim 3 and a new limitation of "a content of the polymer (b) is within a range from 10 to 50 parts by weight, relative to 100 parts by weight of the polymerizable unsaturated monomer (a)." The basis of the amendment is found in original claim 3 and page 9, lines 10-11.

Amended claim 1 includes the following limitations:

(1) that a photocurable sheet-form material comprises: (a) a polymerizable unsaturated monomer; (b) a polymer which is either polymethyl methacrylate or a polymer consisting mainly of methyl methacrylate units and which is compatible or swollen with the monomer (a); (c) a photocuring agent; and (d) fibrous reinforcement;

(2) that the polymerizable unsaturated monomer (a) has a solubility parameter SP within a range from 8.1 to 10.0, which is calculated in accordance with a formula "$SP=\Sigma(G)$ / molecular weight" by using molar attraction constants G, and

(3) that the content of the polymer (b) is within a range from 10 to 50 parts by weight, relative to 100 parts by weight of the polymerizable unsaturated monomer (a).

Applicants note that when the photocurable sheet-form material of the present invention is used, the degree of the viscosity increase is sufficiently prevented to cause a problem in treatment, such as stickiness or the like. As a result, excellent handleability can be achieved. According to the present invention, the polymer (b) can be dissolved without an insoluble matter remained, preventing the problem that the transmittance of light is significantly decreased, thereby increasing the rate of the photocuring of the material. Moreover, the content of the fibrous reinforcement (d) is controlled when the polymer impregnated into the fibrous reinforcement (d) is molded into a sheet form. As a result, the desired properties can be obtained. In fact, the compositions of Examples 1 to 4 described in the specification of the present invention are superior to the composition of Comparative Example 1. Specifically, the viscosity of the compositions of the Examples 1 to 4 is rapidly increased without becoming too high to be kneaded immediately after addition of the polymer (b), the obtained compositions are transparent solid sheets without insoluble matter remained, and the compositions are rapidly cured simply by being irradiated by ultraviolet rays. Therefore, a photocurable sheet-form material of the present invention, comprising all the limitations (1) to (3), has a high productivity, excellent handleability, and excellent photocurability.

(C) In connection with the rejection of original claim 3, the office action alleged that neither of JP 03106942 and Guzauskas discloses that the unsaturated resin solution could be an unsaturated acrylic monomer rather than an unsaturated polyester monomer, and that JP06313019 teaches a

polymerizable resin blend made of an acrylic monomer useful in making composite products such as artificial marble. In addition, the office action alleged that acrylic monomers are also photo polymerizable.

However, Guzauskas (US 5,747,533), JP 03-106942, and JP 06-313019 do not disclose any motivations to combine together to obtain a photocurable sheet-form material of the present invention, having a high productivity, excellent handleability, and excellent photocurability, described as follows.

(i) Guzauskas mainly discloses bulk molding compositions, from the disclosures that the compositions are molding doughs as described at column 6, lines 7 to 9, and that a period of maturation is required for forming a dough as described at column 6, lines 44 to 47, and column 7, lines 22 to 25. Although sheet molding compounds are mentioned in column 12, lines 59 to 63, all of the compositions disclosed in Examples 1 to 8 are with respect to bulk molding compositions, and none of the sheet molding compounds are exemplified. Even though the compositions can be hardened by exposure to UV or visible light as described in column 12, lines 64 to 66, there is no disclosure of sheet molding compounds or sheets, which can be hardened by exposure of UV or visible lights. Thus, a photocurable sheet-form material is not disclosed in Guzauskas.

Moreover, an objective of Guzauskas is to provide a composition having a long shelf life, a low molding pressure, and a low curing temperature, as described in column 6, pages 25 to 29, which is different from that of the present invention.

Although Guzauskas teaches that an acrylic resin thicker, of which a preferable example is polymethyl methacrylate, is used for delaying the viscosity increase of a fiber reinforced composite, the rate of the viscosity increase of the present invention as amended to incorporate the limitations (2) and (3) is relatively high. For example, the degree of the viscosity increase of the composition used in Example 1 or 2 of the present specification was over 1,000 poise at 25 °C for 20 minutes. Therefore, there is no motivation to use the acrylic resin thicker disclosed in Guzauskas for improving the productivity.

In addition, Guzauskas does not teach that when an excess amount of polymethyl methacrylate is added into a composition, polymethyl methacrylate remains as an insoluble ingredient, causing a significantly decrease of the light transmittance, which decreases the rate of the photocuring of the composition. Therefore, Guzauskas does not disclose any motivations for determining the content of polymethyl methacrylate used in order to improve the photocurability.

In addition, Guzauskas does not teach the solubility parameter SP of the polymerizable unsaturated monomer (a). When the SP value is outside of the range from 8.1 to 10.0, the viscosity of the yielded material cannot be sufficiently increased, causing problems in treatment such as stickiness or the like. In fact, the viscosity of the composition of Comparative Example 1 was barely increased, and the composition could not be used as a prepreg. Therefore, Guzauskas does not disclose any motivations for determining the SP value in order to improve the handleability.

(ii) In JP03106942, a composition for forming a photocurable sheet which can be shaped and molded at low temperature is disclosed. The composition disclosed in JP03106942 comprises a

photocurable unsaturated polyester resin solution and a fibrous reinforcement. The photocurable unsaturated polyester resin solution includes a liquid unsaturated polyester resin, a photocuring agent such as 2,2-dimethoxy-2-phenylacetphenone, and a crosslinking monomer such as styrene. Thus, the contents of the composition are different from those of a photocurable sheet-form material of the present invention.

In addition, JP03106942 does not teach the SP value.

(iii) In JP06-313019, a composition for forming an artificial marble having an excellent viscosity increase stability, a high water-resistance, an excellent formability, and an excellent texture is disclosed. Although the composition comprises methyl methacrylate and polymethyl methacrylate, the composition disclosed in JP06-313019 usually includes a filler, as its essential component, as disclosed in claim 7 of JP06-313019. Since the filler disturbs the transmittance of light, the rate of the photocuring of the material is decreased. Therefore, the composition disclosed in JP06-313019 is inappropriate for photocuring, even though the acrylic monomers, *per se*, disclosed in JP06-313019 are photopolymerizable.

As described above, the present invention defined in amended claim 1 is distinct from the cited references. In addition, there is no motivation to combine Guzauskas, JP03-106942 and JP06-313019 together for obtaining a photocurable sheet-form material of the present invention, having a high productivity, excellent handleability and excellent photocurability. Furthermore, even if these references are combined together, the photocurable sheet-form material as defined in the present invention cannot be obtained.

(iv) The mere fact that references can be combined does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. Neither of JP 03106942, Guzauskas and JP06313019 has basis for combining the invention each other to prepare the inventions as defined in the present invention.

(v) Further, prima facie obviousness requires a reasonable expectation of success. "Obvious to try" a modification or combination of references does not establish prima facie obviousness. The examiner tries to replace "unsaturated polyester resin solution" disclosed in JP03106942 with "an acrylic monomer" disclosed in JP06313019. However, there is no motivation to so replace, and therefore, there is no reasonable expectation of success in the references.

(III) In view of the aforementioned amendments and accompanying remarks, claims 1, 2 and 4-8, as herein amended, are in condition for allowance. Applicants request withdrawal of the rejections and passage of the claims to issue at an early date.

If the Examiner believes that this application is not now in condition for allowance, the Examiner is requested to contact Applicants' undersigned attorney at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

In the event that this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees that may be due with respect to this paper to Deposit Account No. 01-2340.

Respectfully submitted,

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